

MISSISSIPPI FLORA. I. MONOCOTYLEDON
FAMILIES WITH AQUATIC OR
WETLAND SPECIES:

by

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ABSTRACT

Keys, distribution maps, habitats, references, nomenclature, and notes are given for some 16 families of monocotyledons occurring naturally or naturalized in Mississippi. These families all contain one or more species which are found in aquatic or wetland habitats. They are: Alismataceae, Araceae, Cannaceae, Haemodoraceae, Hydrocharitaceae, Juncaginaceae, Lemnaceae, Marantaceae, Mayacaceae, Najadaceae, Pontederiaceae, Potamogetonaceae, Ruppiaceae, Sparganiaceae, Typhaceae, Zannichelliaceae.

INTRODUCTION

The primary aim of this paper is to improve our knowledge of the aquatic and wetland plants of Mississippi. In studying a number of families for the Mississippi Flora project, I became aware of the limited collections available for study of many aquatic and wetland species. Hopefully, this paper will be reviewed and criticized by many, and corrected before the proposed Guide to the Flora of Mississippi is published. Any overlooked species, additional collections, needed modifications, or suggestions should be sent to me as soon as possible so that corrections can be made. I should point out that my concept of a species is rather conservative and allows for much ecological as well as genetical variation; therefore, few infraspecific taxa are recognized.

In this day of increasing concern for aquatic and wetland habitats, our knowledge of the plants found in such habitats, especially in the mid-South, is rather limited. There are several reasons for this lack of knowledge. First of all, it is difficult to collect and to prepare specimens of many aquatic species. Until recently there had been little botanical activity within the state of Mississippi. Aquatic and wetland habitats are not continuous over wide geographical areas, so that the collections produce spotty distribution maps.

Support for the field work, begun in 1964, was provided by two National

Science Foundation research grants to the Mississippi Flora project. Later support was also provided to me by the University of Georgia. I am indeed grateful for the support of this research. I am indebted to many individuals who have provided help and cooperation. Foremost among these are Tom Pullen and Ray Watson, my co-investigators on the Mississippi Flora project. Bob Mills and Bob Noble accompanied me on field trips as did my wife Carleen Jones and many of my students. Lionel Eleuterius of the Gulf Coast Research Laboratory helped in many ways, especially with the coastal plants. F. H. Sargent and Ken Rogers, both of whom have a keen eye for plants, turned up many good collections. The first draft of the manuscript was read and criticized by Al Radford and Jim Massey. Wilbur Duncan provided the facilities of the University of Georgia Herbarium. E. C. Ogden made suggestions on *Potamogeton* and Jean Wooten read the Alismataceae. Without their assistance these studies would not have been possible. I am especially fortunate to be able to publish these families in **Gulf Research Reports**, and the assistance of Dr. Gordon Gunter is gratefully acknowledged. Mrs. Mary Ann Keller has patiently prepared the typescript for all of my studies on the Mississippi Flora project.

In undertaking any floristic work one must use information from the published work of many others. Included here are the various manuals that cover some of the species that are found in Mississippi: Small (1933), cited as S in the synonymy; Fernald (1950), cited as F; Gleason and Cronquist (1963) cited as G; Radford, Ahles, and Bell (1968), cited as R. Other frequently used manuals included Steyermark (1963) and Correll and Johnston (1970). Noteworthy is the recent illustrated manual of aquatic and wetland plants by Correll and Correll (1972). It is highly recommended to all aquatic biologists. Many revisionary treatments were used and they are cited in the text.

The keys to the genera and species, while they definitely include the plants of our area, in many instances have been written so as to include plants that might eventually be found in Mississippi. Unless otherwise noted, I have examined one or more specimens of each species from the state. Specimens were examined at the following herbaria: University of Mississippi; Mississippi State University; University of Georgia; University of North Carolina; Duke University; and North Carolina State University. The taxonomic format follows that of the contributors guide to the Mississippi Flora project. The abbreviations of authors' names in this paper follows that of Correll and Johnston. It should be noted that a few species are included which do not grow in aquatic or wetland habitats. This was necessary in order to test the generic keys for the proposed guide. Family keys were not included since all monocotyledon families are not covered in this paper. I would suggest to the reader the family keys in Correll and Johnston, Correll and Correll, or Gleason and Cronquist.

The physiographic regions of Mississippi are outlined in Figure 1. The abbreviations used in the text are: 1, Tennessee River Hills, TRH; 2, Northeastern Prairie Belt, NPB; 3, Pontotoc Ridge, PR; 4, Flatwoods, FW; 5, North Central Plateau, NCP; 6, Jackson Prairie, JP; 7, Loess Bluff Hills, LBH; 8, Yazoo-Mississippi Delta, YMD; 9, Longleaf Pine Region, LPR; 10, Coastal Pine Meadows, CPM. The regions are based on those of Lowe (1921).

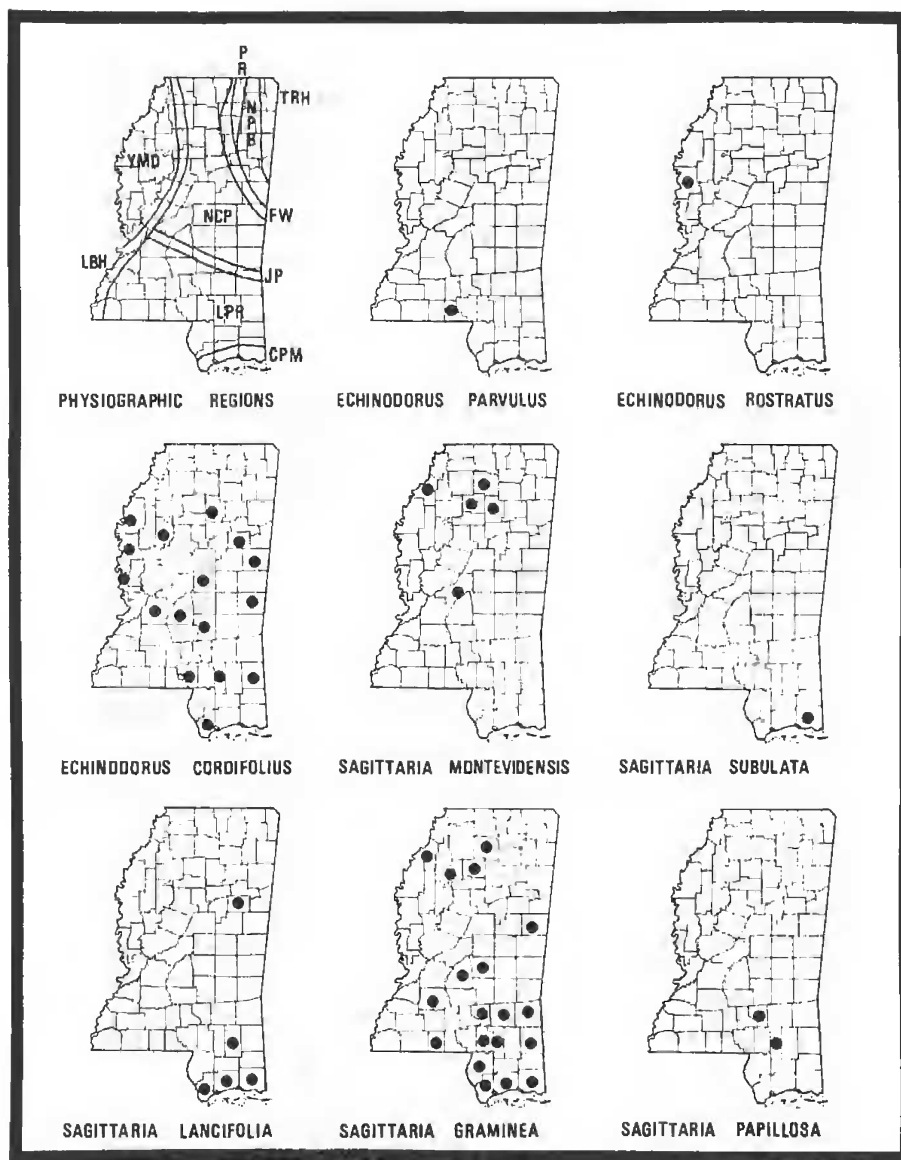


Figure 1. Physiographic regions (see explanation in text) and distribution in Mississippi of *Echinodorus parvulus*, *Echinodorus rostratus*, *Echinodorus cordifolius*, *Sagittaria montevidensis*, *Sagittaria subulata*, *Sagittaria lancifolia*, *Sagittaria graminea*, and *Sagittaria papillosa*.

ALISMATACEAE

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|----------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1. Achenes in a single whorl; receptacle small, flat; stamens 6 | 1. <i>Alisma</i> . |
| 1. Achenes in several series, densely crowded; receptacle large, globose; stamens more than 6. | |
| 2. Achenes ribbed or ridged, not winged; flowers all perfect | 2. <i>Echinodorus</i> . |
| 2. Achenes distinctly winged not ribbed or ridged; flowers perfect or unisexual, the upper ones mostly staminate | 3. <i>Sagittaria</i> . |

Beal (1960a) is a useful reference for this family.

1. ALISMA L. WATER PLANTAIN, MUD PLANTAIN

1. *Alisma subcordatum* Raf., May–Sept. Shallow water, marshes, ponds, streams; though reported from Mississippi by G, R, F, and S, I have seen no material from the state. Hendricks (1957), in his revision of the genus, did not cite a specimen from Mississippi.

2. ECHINODORUS Rich. BURHEAD

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|----------------------------------------------------------------------------------|----------------------------|
| 1. Achenes 20 or fewer in a loose head, beakless. | 1. <i>E. parvulus</i> . |
| 1. Achenes 30–40 or more in a dense tight head, distinctly beaked. | |
| 2. Scape erect; sepals with smooth ridges | 2. <i>E. rostratus</i> . |
| 2. Scape repent or prostrate at maturity; sepals with papillose ridges | 3. <i>E. cordifolius</i> . |

1. *E. parvulus* Engelm., Apr.–Sept. Mud or shallow water, ponds; I have not seen a specimen; reported by Fassett (1955) from Pike Co., LPR. *E. tenellus* (Mart.) Buch.—F. Fig. 1.

2. *E. rostratus* (Nutt.) Engelm., June–Sept. Mud or shallow water of streams, ditches, ponds; YMD. *E. cordifolius* (L.) Griseb.—S. Fig. 1.

3. *E. cordifolius* (L.) Griseb., CREEPING WATER PLANTAIN. Apr.–Sept. Mud or shallow water, ditches, streams, ponds; throughout. *E. radicans* (Nutt.) Engelm.—S. Fig. 1.

3. SAGITTARIA L. ARROWHEAD

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| 1. Pistillate flowers with sepals appressed or spreading; pedicels recurved and thickened in fruit. | |
| 2. Sepals closely appressed to the pistillate flowers; leaves typically sagittate; plants emergent | 1. <i>S. montevidensis</i> . |
| 2. Sepals only loosely appressed to or spreading on the pistillate flowers; leaves filiform; plants usually submerged | 2. <i>S. subulata</i> . |

1. Pistillate flowers with reflexed sepals; pedicels typically ascending, usually not thickened in fruit.
3. Filaments pubescent or minutely scaly.
 4. Bracts papillose or ridged, thickened, nearly free; filaments linear 3. *S. lancifolia*.
 4. Bracts not papillose nor with definite ridges, membranous, more or less connate; filaments dilated 4. *S. graminea*.
3. Filaments glabrous.
 5. Bracts papillose; leaves never sagittate 5. *S. papillosa*.
 5. Bracts not papillose; leaves typically sagittate.
 6. Achene-beak laterally inserted; bracts small, up to 1 cm in length, obtuse to acute 6. *S. latifolia*.
 6. Achene-beak apically inserted; bracts long, 0.8 to 3 cm in length, linear-lanceolate 7. *S. engelmanniana*.

1. *S. montevidensis* Cham. & Schlecht, June–Sept. Sloughs, lakes, ponds, ditches; nw Mississippi. *Lophotocarpus calycinus* (Engelm.) J. G. Sm.—S, F; *S. calycina* Engelm.—R. Our plants have been segregated as ssp. *calycina* (Engelm.) Bogin.

2. *S. subulata* (L.) Buch., June–Sept. Submerged in tidal streams along the coast. *S. filiformis* J. G. Sm., *S. stagnorum* Small, *S. lorata* (Chapm.) Small—S. See Adams and Godfrey (1961). Fig. 1.

3. *S. lancifolia* L., May–Sept, Brackish tidal marshes, fresh water marshes; mainly along the coast but scattered inland. *S. falcata* Pursh—R, F, S; *S. angustifolia*—S. Our plants have been segregated as ssp. *media* (Mich.) Bogin. Often confused with *S. graminea* but differing in the thickish, ribbed or papillose bracts, and large stamens with linear, pubescent filaments. *Sagittaria papillosa* does not have pubescent filaments. Fig. 1.

4. *S. graminea* Michx., June–Sept. Shallow, fresh or brackish water of marshes; abundant along the coast, scattered throughout the interior. *S. eatoni* J. G. Sm., *S. weatherbiana* Fern.—F; *S. teres*, Wats., *S. isoetiformis* J. G. Sm., *S. cycloptera* (J. G. Sm.) Mohr—S; *S. graminea* var. *platyphylla* Engelm.—R; *S. platyphylla* (Engelm)—F, S. Ours have been segregated by Bogin (1955) as var. *platyphylla* Engelm. and var. *chapmani* J. G. Sm. Bogin concludes his treatment of this species by noting that in a genus characterized by variable species, *S. graminea* probably represents the high tide of that variability and that every characteristic is extremely plastic and many intermediate individuals occur. In a guide to the plants of an area, I do not feel that poorly marked and highly variable infraspecific taxa should be recognized. Fig. 1.

5. *S. papillosa* Buch., June–Sept. Ditches, marshes, swamps, ponds; LPR. Often confused with *S. lancifolia* and probably overlooked as both occur together. Both have papillose bracts but *S. papillosa* has glabrous filaments whereas *S. lancifolia* has pubescent filaments. Fig. 1.

6. *S. latifolia* Willd., ARROWLEAF, DUCK-POTATO, WAPATO. June–Sept. Marshes, ditches, stream or pond margins; throughout. *S. ornithorhyncha* Small, *S. pubescens* Muhl.—S; *S. latifolia* var. *obtusata* (Muhl. ex Willd.) Wieg., var. *pubescens* (Muhl.) J. G. Sm.—R, F, G. Bogin said that this species assumes a

bewildering number of ecological variations which in turn have given rise to wide synonymy. He recognized only var. *latifolia* and var. *pubescens*. *S. latifolia* is distinguished by the boat-shaped bracts and the large achenes with laterally inserted beaks of various lengths, Fig. 2.

7. *S. engelmanniana* J. G. Sm., June–Sept. Margins of swamps, ponds, streams, ditches; throughout. *S. australis* (J. G. Sm.) Small—S, F; *S. engelmanniana* ssp. *longirostra* (Mich.) Bogin—S; *S. longirostra* (Mich.) J. G. Sm.—S, R. Our plants have been segregated as ssp. *longirostra* (Mich.) Bogin, Fig. 2.

Adapted from the treatment of *Sagittaria* by Bogin, the work of Wooten (1973) is a valuable addition to our knowledge of this highly variable genus.

ARACEAE

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|-------------------------------------------------------------------------------------------------------------------|-----------------------|
| 1. Plants floating | 5. <i>Pistia</i> . |
| 1. Plants rooted in soil. | |
| 2. Spathe well-developed, fleshy or petaloid, enclosing the inflorescence. | |
| 3. Leaves compound | 1. <i>Arisaema</i> . |
| 3. Leaves simple | 2. <i>Peltandra</i> . |
| 2. Spathe absent, or obscure or like the foliage leaves, not enclosing the inflorescence. | |
| 4. Spadix naked, terminating the terete scape; leaf blades oblong | 3. <i>Orontium</i> . |
| 4. Spadix much-overtopped by the swordlike spathe that resembles the foliage leaves; leaf blades linear | 4. <i>Acorus</i> . |

Wilson (1960) is an excellent general reference for this family in the south-eastern United States.

1. ARISAEMA Mart.

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|-----------------------------------------------------------------------------------------|---------------------------|
| 1. Primary leaf pedately divided into 5–15 very unequal leaflets | 1. <i>A. dracontium</i> . |
| 1. Primary leaf palmately divided into 3–5 segments. | |
| 2. Primary leaf with 5 segments, the lateral segments sometimes partly united | 2. <i>A. quinatum</i> . |
| 2. Primary leaf with 3 segments, the lateral segments rarely bilobed | 3. <i>A. triphyllum</i> . |

1. *A. dracontium* (L.) Schott, GREEN DRAGON-ROOT. Apr.–May. Low rich woodlands; throughout, except YMD. *Muricauda dracontium* (L.) Small—S. Fig. 2.

2. *A. quinatum* (Nutt.) Schott, JACK-IN-THE-PULPIT, INDIAN-TURNIP. Apr.–May. Moist wooded areas, loess bluffs; scattered throughout except CPM and YMD. Fig. 2.

3. *A. triphyllum* (L.) Schott, JACK-IN-THE-PULPIT, INDIAN-TURNIP. Apr.–May. Moist wooded areas; throughout. *A. pusillum* (Peck) Nash, *A. acuminatum*

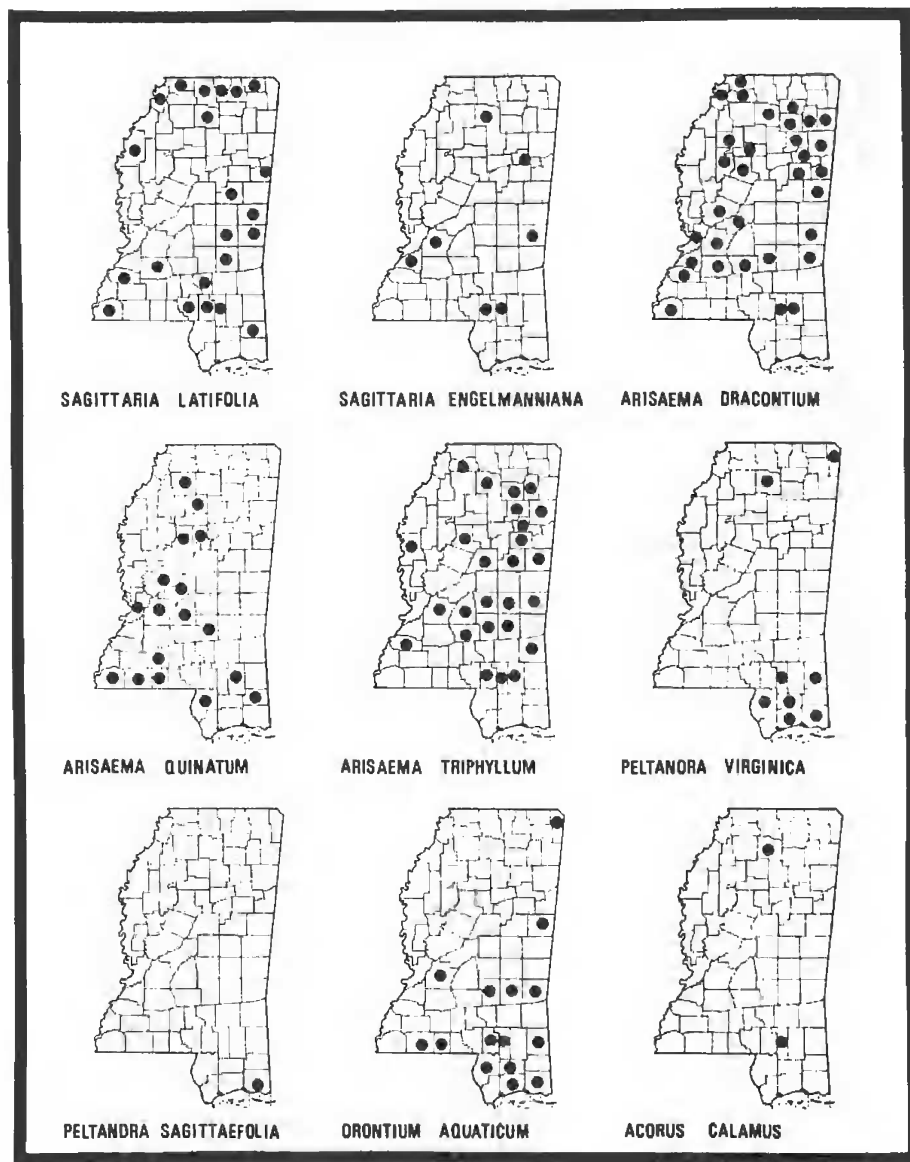


Figure 2. Distribution in Mississippi of *Sagittaria latifolia*, *Sagittaria engelmanniana*, *Arisaema dracontium*, *Arisaema quinatum*, *Arisaema triphyllum*, *Peltandra virginica*, *Peltandra sagittaeifolia*, *Orontium aquaticum*, and *Acorus calamus*.

Small—S; *A. atrorubens* (Ait.) Bl., *A. stewardsonii* Britt.—F; *A. triphyllum* var. *stewardsonii* (Britt.) Stevens, *A. triphyllum* var. *pusillum* Peck—G. Fig. 2.

2. PELTANDRA Raf. ARROW-ARUM

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|---------------------------------------------------------|-------------------------------|
| 1. Spathe green; berries greenish or blackish | 1. <i>P. virginica</i> . |
| 1. Spathe white; berries red | 2. <i>P. sagittaeifolia</i> . |

1. *P. virginica* (L.) Kunth, May–July. Wooded swamps, edge of ponds; mostly se scattered in ne. Fig. 2.

2. *P. sagittaeifolia* (Michx.) Morong, May–July. Low moist woods, swamps; along coast. *P. glauca* (Ell.) Feay ex Wood—S. Fig. 2.

3. ORONTIUM L. GOLDEN CLUB

1. *Orontium aquaticum* L., Mar.–Apr. Swamps, streams, shallow water of ponds; CPM, LPR, TRH, abundant near the coast. For additional information on this colorful species see Gear (1966). Fig. 2.

4. ACORUS L. CALAMUS, SWEETFLAG, CALOMEL

1. *Acorus calamus* L., May–Aug. Wet places; scattered throughout. Harper (1936) noted that “calomel root” was cultivated by black families who used it medicinally. Fig. 2.

5. PISTIA L. WATER-LETTUCE

1. *P. stratiotes* L., May–June. Streams, lakes, and ponds; reported by Correll & Correll to occur along the Gulf Coast. I have seen specimens from La. but none from our state. It should be watched for in the coastal counties.

CANNACEAE

1. CANNA L. CANNAS

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|------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Corolla tube longer than or equaling the lobes; fruit
twice or more as long as broad | 1. <i>C. flaccida</i> . |
| 1. Corolla tube shorter than lobes; fruit as long as broad
or nearly so | 2. <i>C. generalis</i> . |

1. *C. flaccida* Salisb., GOLDEN CANNA. June–Aug. Marshes; along the coast. It was collected in the late 1800's in Jackson Co. but no recent specimens have been seen and it may be extinct. There is one recent collection from Attalla Co. which undoubtedly represents an escape. I have seen it on Dauphin Island in nearby Ala. Fig. 3.

2. *C. generalis* Bailey, COMMON GARDEN CANNA. June–Oct. Commonly cultivated and escaping to disturbed habitats and ditches. This taxon represents horticultural hybrids and is highly variable with many named cultivars. Fig. 3.

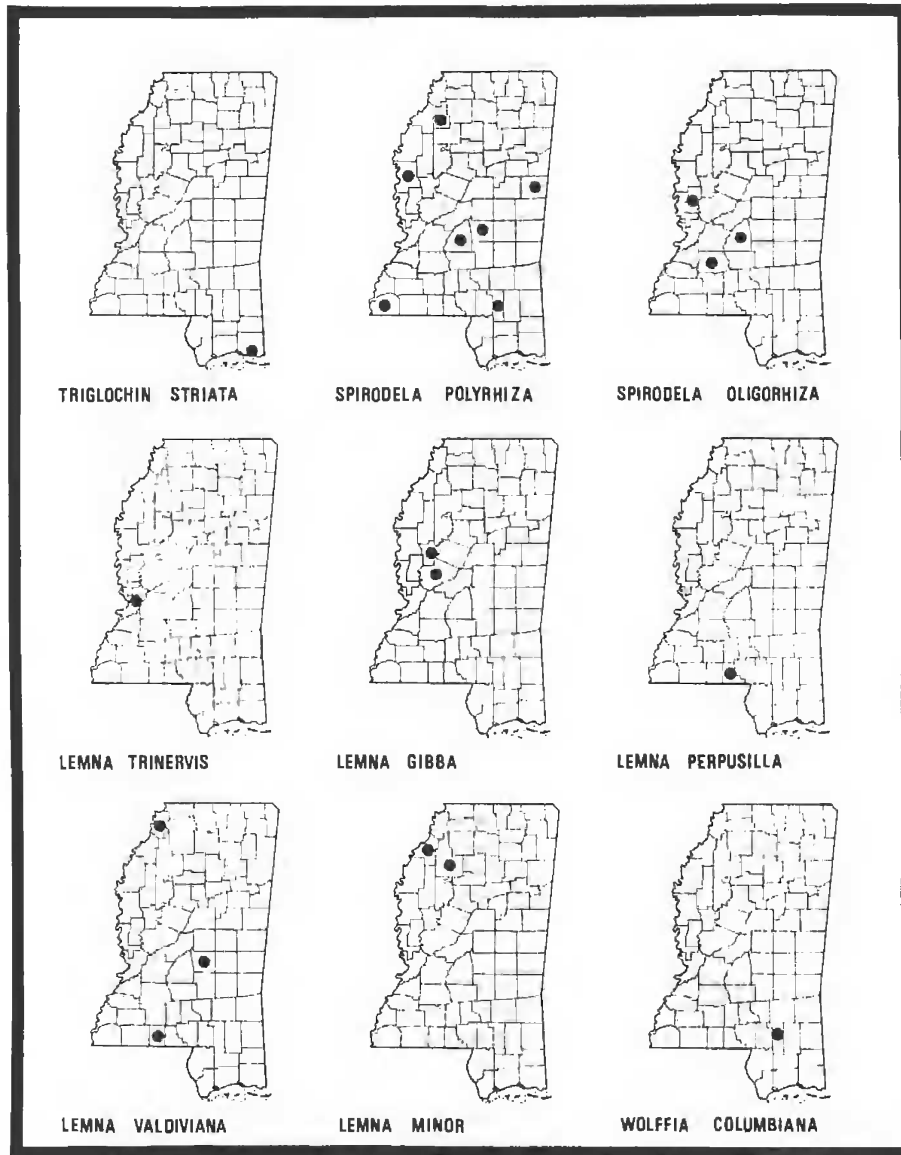


Figure 3. Distribution in Mississippi of *Canna flaccida*, *Canna generalis*, *Lachnanthes caroliniana*, *Lophiola americana*, *Limnobium spongia*, *Vallisneria americana*, *Elodea nuttallii*, *Thalassia testudinum* and *Halophila engelmannii*.

HAEMODORACEAE

1. Stamens 3, exserted; style deciduous; petals exceeding sepals by more than 2 mm 1. *Lachnanthes*.
1. Stamens 6, included; style persistent; petals and sepals about equal in length 2. *Lophiola*.

1. LACHNANTHES Ell. REDROOT

1. *L. caroliniana* (Lam.) Dandy, June–Sept. Wet savannahs, ditches, wet pinelands, bogs; CPM and se LPR. *Gyrotheca tinctoria* (Walt.) Salisb.—S; *L. tinctoria* (Walt.) Ell.—F, G. Fig. 3.

2. LOPHIOLA Ker. GOLDCREST

1. *L. americana* (Pursh) Wood, May–June. Savannahs, wet pinelands; CPM and se LPR. *L. aurea* Ker.—S. Fig. 3.

HYDROCHARITACEAE

1. Freshwater plants.
 2. Leaves broadly ovate to reniform, with a differentiated petiole 1. *Limnobium*.
 2. Leaves linear or ribbon-like, without a differentiated petiole.
 3. Leaves ribbon-like, basal 2. *Vallisneria*.
 3. Leaves not ribbon-like, cauline.
 4. Leaves in whorls of 4 or 5 3. *Egeria*.
 4. Leaves in whorls of 3 4. *Elodea*.
1. Marine plants.
 5. Leaves alternate on a short stout concealed stem, ribbon-like, 1 dm long or longer 5. *Thalassia*.
 5. Leaves opposite at tip of stem, oblong-elliptic, 5 cm or less long 6. *Halophila*.

1. LIMNOBIUM Rich. FROG'S-BIT

1. *L. spongia* (Bosc) Steud., June–Oct. Floating on shallow quiet ponds, swamps, ditches; scattered throughout, uncommon. Fig. 3.

2. VALLISNERIA L. TAPEGRASS, EELGRASS, WATER-CELERY

1. *V. americana* Michx., June–Oct. Submerged in fresh water streams near the coast, which may be brackish at high tides. Fig. 3.

3. EGERIA Planch. WATERWEED

1. *E. densa* Planch., May–Nov. Ponds; reported by R based upon a cultivated

specimen from Grenada in the Univ. of N. C. Herbarium. St. John (1961), in his monograph of *Egeria*, does not cite a specimen from Mississippi. *Philotria densa* (Planch.) Small—S; *Elodea densa* (Planch.) Casp.—F; *Anacharis densa* (Planch.) Vict.—G.

4. ELODEA Michx. WATERWEED

1. *E. nuttallii* (Planch.) St. John, June–Oct. Ponds; reported by St. John (1965) from Holmes Co., YMD. *Anacharis nuttallii* Planch.—G. Fig. 3.

5. THALASSIA Soland. TURTLEGRASS

1. *T. testudinum* König., Aug.—Nov. Submerged in shallow salt water of Mississippi Sound where it forms dense grass beds on sandy bottoms, common. Fig. 3.

6. HALOPHILA Thou SEAGRASS

1. *H. engelmannii* Asch., June–Dec. Submerged in shallow salt water of Mississippi Sound where it forms part of the flora of the grass beds; uncommon. Fig. 3.

JUNCAGINACEAE

1. TRIGLOCHIN L. ARROWGRASS

1. *T. striata* R. & P., Apr.—Sept. Wet, sandy or mucky soil, salt marshes. Fig. 4.

LEMNACEAE

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|-----------------------------------------------------------------------------------|------------------------|
| 1. Roots present on plants, arising from the lower side of the flattened thallus. | |
| 2. Each thallus with usually two or more roots | 1. <i>Spirodela</i> . |
| 2. Each thallus with one root | 2. <i>Lemna</i> . |
| 1. Roots absent. | |
| 3. Thallus globular or ellipsoidal | 3. <i>Wolffia</i> . |
| 3. Thallus sickle-shaped, elongate and linear | 4. <i>Wolffiella</i> . |

Two useful references on this family are Harrison and Beal (1964) and Daubs (1965).

1. SPIRODELA Schleid. DUCKWEED, DUCKMEAT

1. Thallus conspicuously several-nerved with the nerves radiating from the stipe base, each thallus with

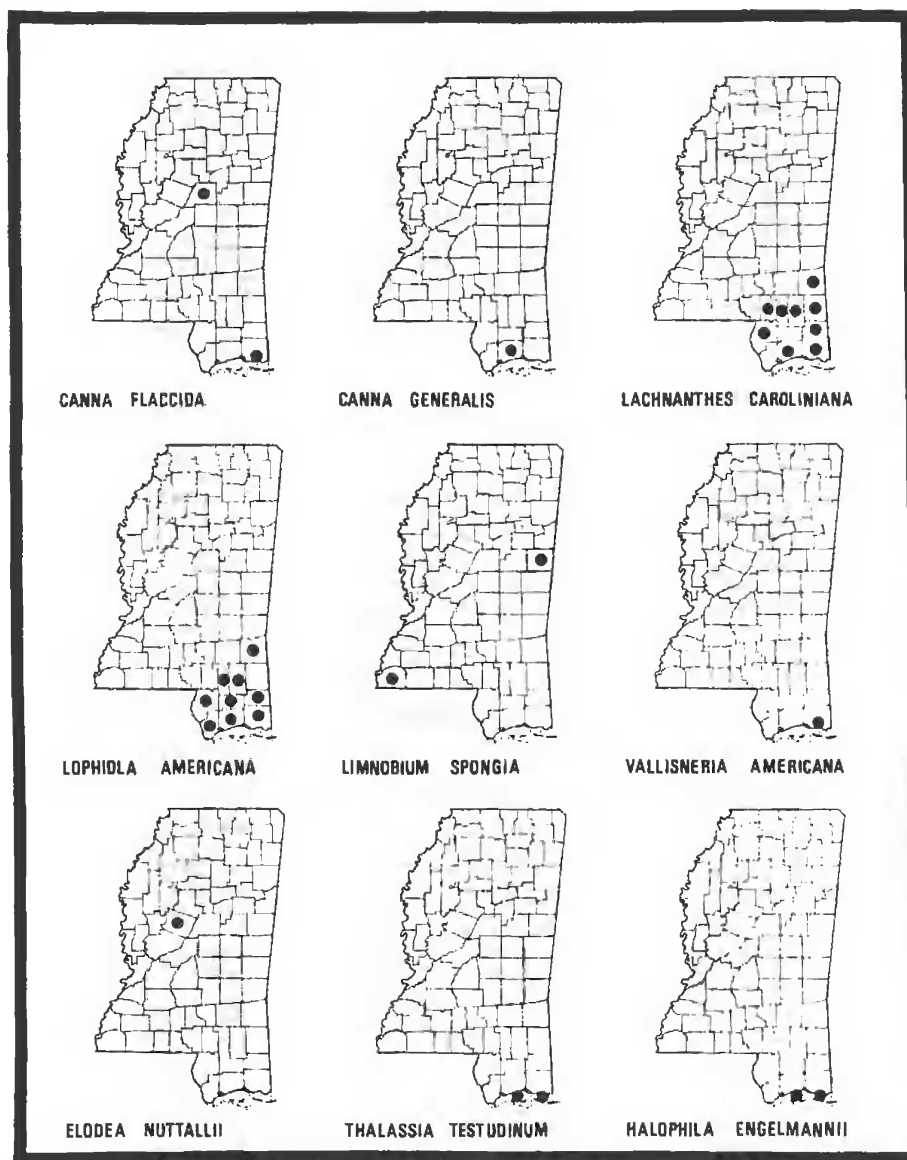


Figure 4. Distribution in Mississippi of *Triglochin striata*, *Spirodela polyrhiza*, *Spirodela oligorhiza*, *Lemna trinervis*, *Lemna gibba*, *Lemna perpusilla*, *Lemna valdiviana*, *Lemna minor*, and *Wolffia columblana*.

- 5 to many roots; thallus orbicular-obovate, not punctate 1. *S. polyrhiza*.
1. Thallus faintly nerved, each thallus with 2-4 roots; thallus oblong-obovate to slightly elliptic, punctate 2. *S. oligorhiza*.

1. *S. polyrhiza* (L.) Schleid. Present at all seasons but especially abundant in the late summer and fall, Quiet waters, ponds, lake margins, bayous; scattered throughout. Fig. 4.

2. *S. oligorhiza* (Kurtz) Hegelm. Abundant in late summer and fall. Margins of pools, ponds, bayous; scattered in sw Mississippi. This is a Far Eastern species which has been introduced into the United States and is now rather widespread. Fig. 4.

2. LEMNA L. DUCKWEED

1. Thallus indistinctly to prominently 3-nerved.
2. Thallus distinctly 3-nerved 1. *L. trinervis*.
2. Thallus usually not prominently nerved.
3. Thallus orbicular-obovate, inflated beneath; root sheath without wings or appendages 2. *L. gibba*.
3. Thallus obovate to elliptical, not inflated beneath, root sheath with definite wings or appendages . . . 3. *L. perpusilla*.
1. Thallus nerveless or very obscurely 1-nerved.
4. Thallus elliptic-oblong to crescent shaped 4. *L. valdiviana*.
4. Thallus orbicular-obovate or elliptic-obovate.
5. Thallus orbicular-obovate, inflated and noticeably convex beneath; thallus yellow-green above . . . 2. *L. gibba*.
5. Thallus elliptic-obovate, not inflated but flat or slightly convex beneath; thallus dark green above 5. *L. minor*.

1. *L. trinervis* (Aust.) Small, Abundant in late summer and fall. Margins of lakes, streams, ponds; YMD. *L. perpusilla* var. *trinervis*—F. Fig. 4.

2. *L. gibba* L., INFLATED DUCKWEED, WINDBAGS, Abundant late in the season. Ponds, sloughs; YMD. Fig. 4.

3. *L. perpusilla* Torr., Summer. Margins of ponds, lakes; LPR. Fig. 4.

4. *L. valdiviana* Phil., Summer. Ponds, lakes and ditches; abundant and common, producing large vegetative masses, throughout. *L. cyclostasa* (Ell.) Chev.—S. Fig. 4.

5. *L. minor* L., WATER LENTIL, Most abundant in summer. Quiet waters of sloughs, lakes, ditches; YMD. Fig. 4.

3. WOLFFIA Horkel WATER-MEAL

1. Thallus mostly globular, the dorsal surface strongly convex, without a papilla, not punctate 1. *W. columbiana*.
1. Thallus ellipsoidal or broadly ovoid, with a prominent conical papilla, punctate 2. *W. papulifera*.

1. *W. columbiana* Karst., Ponds, sloughs; YMD, LPR. Fig. 4.
2. *W. papulifera* Thoms., Ponds, sloughs; Ken Rogers (personal communication) collected this species in Forrest Co., LPR. I have not seen the specimen. Fig. 5.

4. WOLFFIELLA Hegelm. MUD-MIDGET, BOG MAT

1. *W. floridana* (J. D. Sm.) Thoms., Ponds, ditches, sloughs; reported by R to be in Mississippi, Ken Rogers (personal communication) collected this species in Forrest Co., LPR; however, I have not seen this or any other specimen. Fig. 5.

MARANTACEAE

1. THALIA L. POWDERY THALIA

1. *T. dealbata* Roscoe, June–Oct. Wet ditches, edge of ponds, margins of swamp forests; one location in Leflore Co., YMD, rare. Fig. 5.

MAYACACEAE

1. MAYACA Aubl. BOGMOSS

1. Pedicels longer than the leaves; capsules globular or ovoid; stems 2–20 cm long 1. *M. aubletii*.
1. Pedicels shorter than the leaves; capsules ellipsoid; stems often 40 cm long 2. *M. fluviatilis*.
1. *M. aubletii* Michx., July–Aug. Springy places, margins of pools or streams; CPM & se LPR, common, Fig. 5.
2. *M. fluviatilis* Aubl., July–Aug. Submerged in streams, pools; CPM and se LPR, local. Fig. 5.

NAJADACEAE

1. NAJAS L. BUSHY PONDWEED, WATER NYMPH

1. Leaf-bases broadly and auriculately lobed 1. *N. gracillima*.
1. Leaf-bases not broadly and auriculately lobed but sloping 2. *N. guadalupensis*.
1. *N. gracillima* Magnus, June–Oct. Ponds and lakes; LPR. Fig. 5.
2. *N. guadalupensis* (Spreng.) Magnus, June–Oct. Ponds, lakes, estuaries; LPR, CPM. Fig. 5.

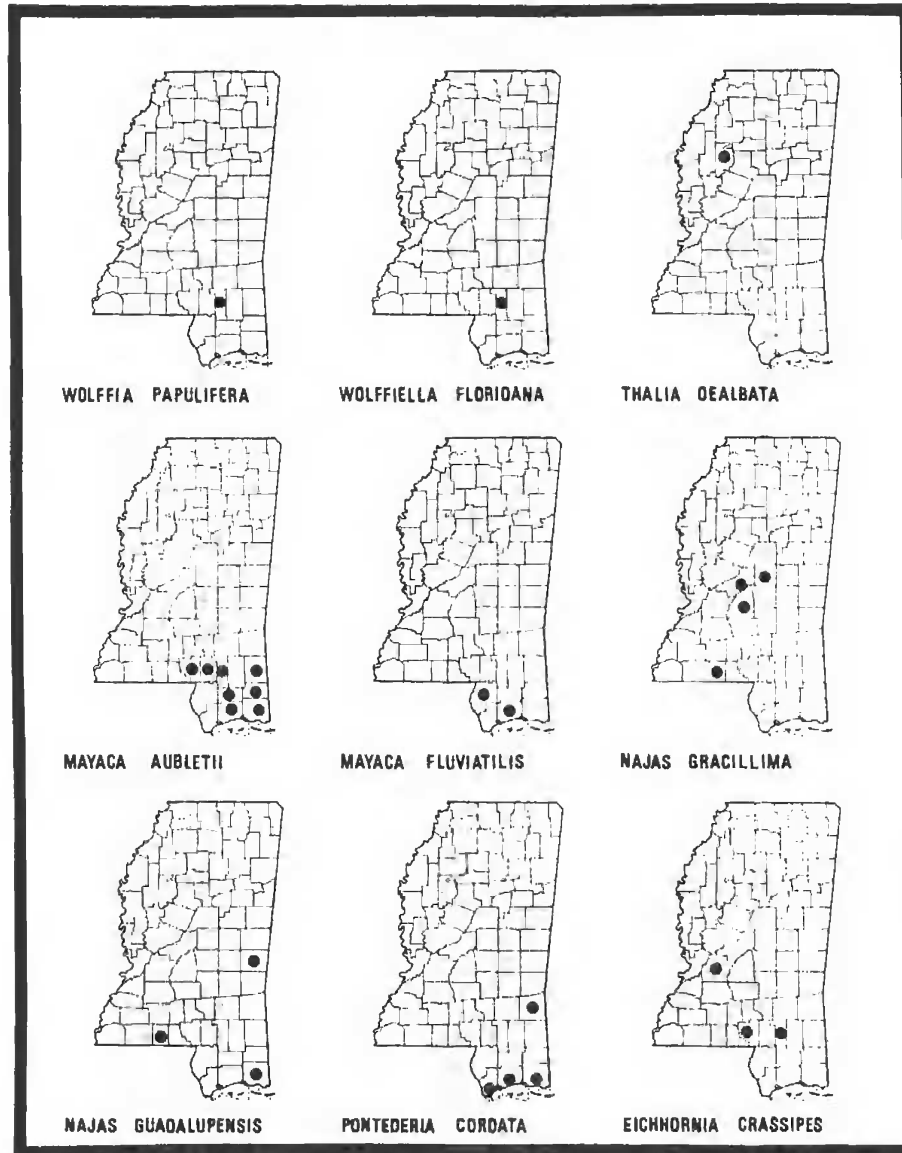


Figure 5. Distribution in Mississippi of *Wolffia papulifera*, *Wolffella floridana*, *Thalia dealbata*, *Mayaca aubletii*, *Mayaca fluvialis*, *Najas gracillima*, *Najas guadalupensis*, *Pontederia cordata*, and *Eichornia crassipes*.

As is often the case with aquatics, these two species are more common than indicated by the distribution maps. This is adapted from the treatment of Clausen (1936).

PONTEDERIACEAE

1. Flower 2-lipped; stamens 6, 3 exserted and 3 included.
2. Corolla lobes 1 cm long or less; ovary 1-celled; plants attached to the soil; petioles not inflated 1. *Pontederia*.
2. Corolla lobes 3–4 cm long; ovary 3-celled; plants usually free floating; petioles inflated 2. *Eichhornia*.
1. Flower regular or nearly so; stamens 3, exserted 3. *Heteranthera*.

1. PONTEDERIA L. PICKERELWEED

1. *P. cordata* L., Apr.–Sept. Shallow water, marshes, ditches; CPM and e LPR. Includes *P. lanceolata* Nutt.—S, F, G. Fig. 5.

2. EICHHORNIA Kunth WATER-HYACINTH

1. *E. crassipes* (Mart.) Solms., June–Sept. Ponds, lakes, sloughs; s Mississippi. *Piaropus crassipes* (Mart.) Britt.—S. Fig. 5.

3. HETERANTHERA R. & P. MUD-PLANTAIN

1. Leaves sessile, blades linear, grasslike; spathe sessile in axils of leaves; stamens all alike, anthers coiled with age.
2. Perianth tube much less than twice as long as the spathe; seeds ellipsoid, yellow-brown, the 10–12 membranaceous wings soon disappearing . . 1. *H. dubia*.
2. Perianth tube twice as long as the spathe or longer; seeds nearly globose, black-brown, the 14–16 wings persistent 2. *H. liebmannii*.
1. Leaves petioled, blades expanded; spathe peduncled; stamens of two forms, anthers not coiled.
3. Leaf blades ovate to elliptic or elliptic-lanceolate; spathe 1-flowered 3. *H. limosa*.
3. Leaf blades round-reniform; spathe 3–10 flowered . . 4. *H. reniformis*.

1. *H. dubia* (Jacq.) MacM., WATER STAR GRASS. Streams, quiet waters; reported by R to occur in the state, I have seen no specimens. *Zosteralla dubia* (Jacq.) Small—S, G.

2. *H. liebmannii* (Buch.) Shinnars, Apr.–July. On mud or floating in ponds, ditches; distribution reported by Correll and Johnston includes Mississippi, no specimens have been seen.

3. *H. limosa* (Sw.) Willd., June–Oct. Wet soil, lakes, ponds; scattered in w-central Mississippi. Fig. 6.

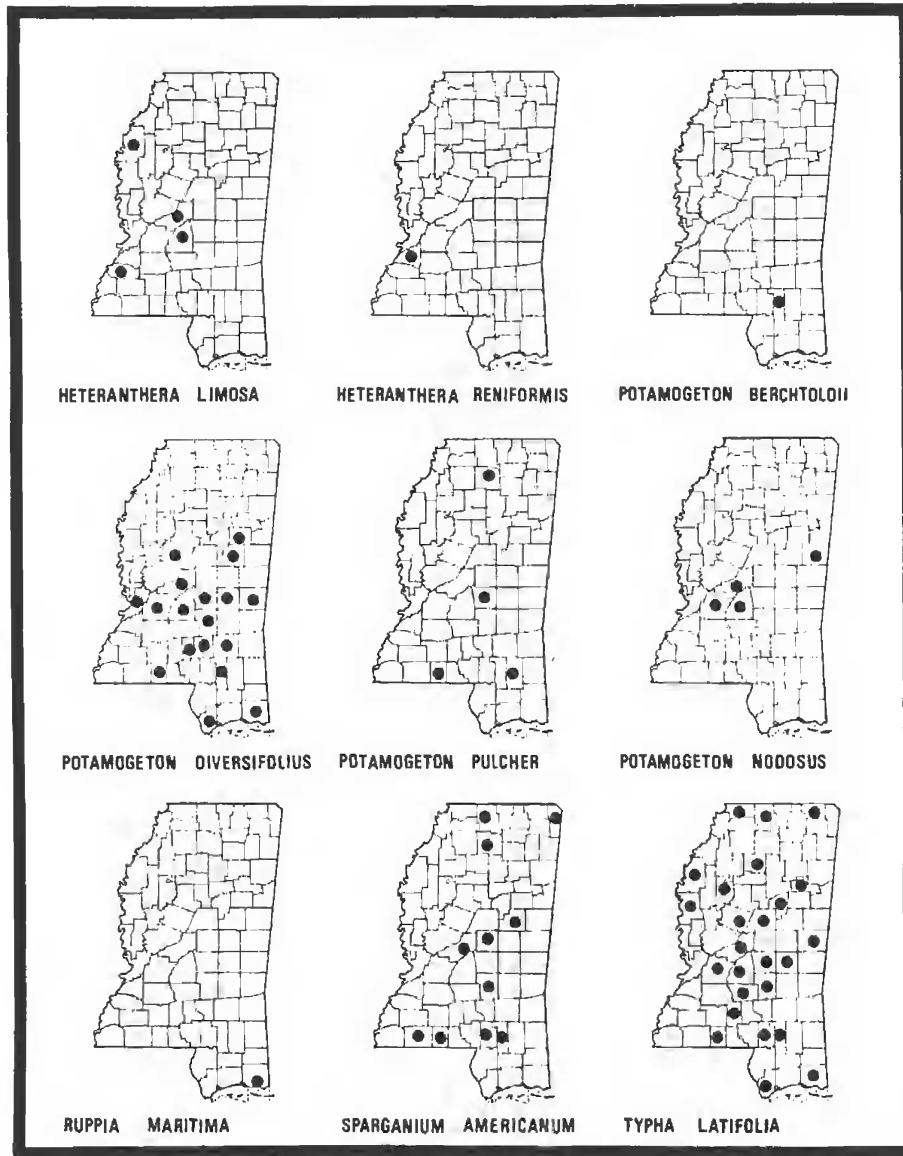


Figure 6. Distribution in Mississippi of *Heteranthera limosa*, *Heteranthera reniformis*, *Potamogeton berchtoldii*, *Potamogeton diversifolius*, *Potamogeton pulcher*, *Potamogeton nodosus*, *Ruppia maritima*, *Sparganium americanum*, and *Typha latifolia*.

4. *H. reniformis* R. & P., July–Aug. Creeping on mud or in shallow water, ponds, streams; Claiborne Co. Fig. 6.

This treatment is adapted from Correll and Johnston. Additional collections of *Heteranthera* are badly needed.

POTAMOGETONACEAE

1. POTAMOGETON L. PONDWEED, FISHWEED

1. Submerged leaves linear, most more than 10 times as long as wide.
2. Stipules united with the base of the leaf for a distance of at least 10 mm; floating leaves absent 1. *P. pectinatus*.
2. Stipules not united with the base of the leaf or if united then for a distance of less than 10 mm.
3. Floating leaves absent; stipules completely free from the base of the leaf; seed not coiled more than 1 revolution, the coil not evident through the thick pericarp.
4. Fruits with a thin wing-like undulate dorsal keel; nodal glands usually absent 2. *P. foliosus*.
4. Fruits with a rounded or obscure dorsal keel; nodal glands usually present.
5. Leaves with 3–5 veins; stipules connate when young; peduncles 1.5–8 cm long; spikes 6–12 mm long, of 3–5 separate whorls 3. *P. pusillus*.
5. Leaves with 1–3 veins; stipules not connate; peduncles rarely more than 3 cm long; spikes 2–8 mm long, of 1–3 contiguous whorls 4. *P. berchtoldii*.
3. Floating leaves usually but not always present; stipules free or united with the base of the leaf for a distance of less than 7 mm; the coil evident through the thin pericarp 5. *P. diversifolius*.
1. Submerged leaves lanceolate to ovate, mostly less than 10 times as long as broad.
6. Leaves sessile, all submerged, cordate and clasping the stem 6. *P. perfoliatus*.
6. Leaves sessile or petioled, submerged leaves not cordate nor clasping the stem.
7. Tips of submerged leaves acute to sharp pointed sometimes mucronate; stipules firm 7. *P. illinoensis*.
7. Tips of submerged leaves acute but not sharp pointed; stipules delicate.
8. Floating leaves with 21–29 + veins, bases usually cordate, rarely rounded 8. *P. pulcher*.
8. Floating leaves with 9–21 veins, bases cuneate or rounded 9. *P. nodosus*.

1. *P. pectinatus* L., June–Oct. Brackish or calcareous ponds, lakes, estuaries; reported by R to be in Mississippi but no specimens have been seen, although it has been collected in La.
2. *P. foliosus* Raf., June–Oct. Brackish or calcareous ponds, lakes, streams; reported by R to be in Mississippi but no specimens have been seen. Eugene Ogden (personal communication) indicates it is in La., Ark., and Tenn.
3. *P. pusillus* L., May–Oct. Neutral or slightly alkaline or brackish water of ponds; reported by Ogden (1966) to be over most of eastern U. S. but no specimens have been seen from Mississippi. It has been collected in La. and Ark. (Ogden, personal communication).
4. *P. berchtoldii* Fieb., May–Oct. Ponds, slow-moving streams; one collection by Ken Rogers from Forrest Co., LPR, not seen by writer but it was det. by Ogden. Fig. 6.
5. *P. diversifolius* L., June–Oct. Ponds, lakes; throughout, common. Includes *P. capillaceus* Poir.—F. Sensus Klekowski and Beal (1965). Fig. 6.
6. *P. perfoliatus* L., June–Oct. Neutral to calcareous or brackish water, ponds, streams, estuaries. R reported it in Mississippi but no specimens have been seen. It has been collected in Alabama.
7. *P. illinoensis* Morong, June–Oct. Quiet or flowing water, streams, ponds; reported by R to be in the state but no specimens have been seen. Ogden has seen it from Ark. *P. lucens* L., *P. angustifolius* Bercht. & Presl.—S.
8. *P. pulcher* Tuckerm., June–Oct. Ponds, lakes; scattered throughout, common. Fig. 6.
9. *P. nodosus* Poir., June–Oct. Ponds, lakes, slow moving streams; central Mississippi. *P. fluitans* Roth—S. Fig. 6.

Adapted from the treatments of Ogden, and Radford *et al.* *Potamogeton* has been poorly collected in Mississippi. We need some field botanists who do not object to getting their feet wet! A useful reference is Hotchkiss (1964).

RUPPIACEAE

1. RUPPIA L. DITCHGRASS, WIDGEONGRASS

1. *R. maritima* L., July–Oct. Submerged in shallow, brackish rivers, ponds, estuaries; along the coast and in lagoons and ponds on the barrier islands, it grows on soil with high organic matter content. Fig. 6.

SPARGANIACEAE

1. SPARGANIUM L. BUR-REED

1. *S. americanum* Nutt., June–Sept. Shallow ponds, streams; scattered throughout except in CPM, YMD and LBH. *S. eurycarpum* Engelm.—S, misapplied. Concept of this species sensu Beal (1960b). *Sparganium* provides an excellent example of the former paucity of collections prior to our field work on the Mis-

Mississippi Flora Project. Beal borrowed specimens from all of the proper herbaria but found none from Mississippi. Fig. 6.

TYPHACEAE

1. TYPHA L. CAT-TAIL

- | | |
|-----------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. Stigmas lanceolate to ligulate; staminate and pistillate portion of spike usually contiguous | 1. <i>T. latifolia</i> . |
| 1. Stigmas filiform to linear; staminate and pistillate portions of the spike usually separated. | |
| 2. Abortive pistil with a truncate-flattened apex | 2. <i>T. angustifolia</i> . |
| 2. Abortive pistil with a rounded apex | 3. <i>T. domingensis</i> . |

1. *T. latifolia* L., COMMON CAT-TAIL. Apr.—May. Marshes, shallow water, ditches; throughout. *Typha latifolia* hybridizes with *T. angustifolia* to form *T. x glauca* Godr. The hybrids have linear-lanceolate stigmas. Fig. 6.

2. *T. angustifolia* L., NARROW-LEAVED CAT-TAIL. Apr.—May. Coastal and inland marshes; s Mississippi. Fig. 7.

3. *T. domingensis* Pers., Apr.—May. Marshes; this species has been reported from along the coast and Ken Rogers (personal communication) has it from Forrest Co., but no specimens have been seen by this writer. Leaf measurements overlap with *T. angustifolia*. The best character appears to be the abortive ovary apex as used in this key. Fig. 7.

Treatment adapted from Hotchkiss and Dozier (1949) and Fassett and Calhoun (1952).

ZANNICHELLIACEAE

- | | |
|-----------------------------------------------------------------------------------------------------|--------------------------|
| 1. Leaves from simple or much branched, floating, submerged stems, which are rooted to bottom . . . | 1. <i>Zannichellia</i> . |
| 1. Leaves from submerged stems which are sometimes covered by sediments. | |
| 2. Leaves flat | 2. <i>Halodule</i> . |
| 2. Leaves terete or nearly so | 3. <i>Cymodocea</i> . |

1. ZANNICHELLIA L. HORNED PONDWEED, POOLMAT

1. *Z. palustris* L., Fresh or brackish water of ditches, ponds; Hancock and Oktibbeha Counties. Fig. 7.

2. HALODULE Endl.

1. *H. beaudettei* (Den Hartog) Den Hartog, Submerged in Mississippi Sound, on sandy bottoms, one of the species that forms the grass beds, common. *Halodule*

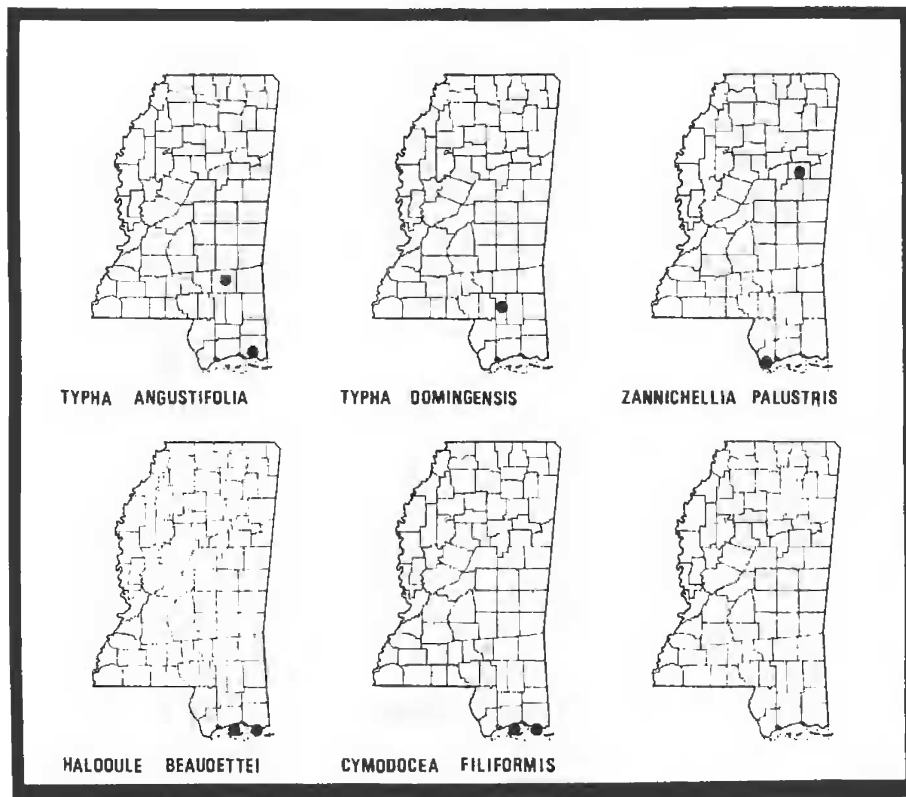


Figure 7. Distribution in Mississippi of *Typha angustifolia*, *Typha domingensis*, *Zannichellia palustris*, *Halodule beaudettei*, and *Cymodocea filiformis*.

wrightii Asch.—S; *Diplanthera beaudettei* Den Hartog of authors. *D. wrightii* (Asch.) Asch., of authors. Treatment follows that of Den Hartog (1964) who indicates that *Diplanthera* is illegitimate because it had been applied earlier to another genus. Fig. 7.

3. CYMODOCEA König. MANATEE-GRASS

1. *C. filiformis* (Kütz.) Correll, Submerged in deeper water of Mississippi Sound, bottom has some organic matter present, one of the members of the "sea grass" community. *C. manatorum* Asch.—S. *Syringodium filiforme* Kütz., of authors; *S. filiformis* Kütz., of authors. Fig. 7.

Manatee-grass usually appears in the marine literature as *Cymodocea manatorum* or as *Syringodium filiforme*. It is indeed unfortunate when well known names such as *Halodule* or in this case for Manatee-grass must be changed but it is necessary

for nomenclatural stability. Correll (1968 and personal communication) pointed out that *S. filiforme* published in 1860 is an earlier name than *C. manatorum* published in 1868. Therefore, it was necessary for him to make the combination *C. filiforme* (Kütz.) Correll. Detailed information on the nomenclature of *Halodule* and *Cymodocea* can be found in Den Hartog and in Correll.

Another confusing point concerns the spelling and abbreviation of the author's name. Correll and Johnston (1970, cf. p. 1780) list Kütz. for F. T. (Kuetzing) Kützing.

LITERATURE CITED

- ADAMS, P. and R. K. GODFREY
1961. Observations on the *Sagittaria subulata* complex. *Rhodora* 63:247-266.
- BEAL, E. O.
1960a. The Alismataceae of the Carolinas, J. Elisha Mitchell Soc. 76:68-79.
1960b. *Sparganium* (Sparganiaceae) in the southeastern United States. *Brittonia* 12:176-181.
- BOGIN, C.
1955. Revision of the genus *Sagittaria* (Alismataceae). *Mem. N. Y. Botan. Gard.* 9:179-233.
- CLAUSEN, R. T.
1936. Studies in the genus *Najas* in the northern United States. *Rhodora* 38:332-346.
- CORRELL, D. S.
1968. Some additions and corrections to the flora of Texas VI. *Wrightia* 4:74-78.
- CORRELL, D. S. and H. B. CORRELL
1972. Aquatic and wetland plants of southwestern United States. E. P. A. U. S. Gov. Printing Office, Washington, D. C. 1777 pp.
- CORRELL, D. S. and M. C. JOHNSTON
1970. Manual of the vascular plants of Texas. Texas Res. Foundation, Renner, Texas. 1881 pp.
- DAUBS, E. H.
1965. A monograph of Lemnaceae. *Ill. Biol. Monog.* number 34.
- DEN HARTOG, C.
1964. An approach to the taxonomy of the seagrass genus *Halodule* Endl. (Potamogetonaceae). *Blumea* 12:289-312.
- FASSETT, N. C.
1955. *Echinodorus* in the American Tropics. *Rhodora* 57:187.
- FASSETT, N. C. and B. CALHOUN
1952. Introgression between *Typha latifolia* and *T. angustifolia*. *Evolution*. 6:367-379.
- FERNALD, M. L.
1950. Gray's Manual of Botany, 8th ed. American Book Co., N. Y. 1632 pp.
- GLEASON, H. A. and A. CRONQUIST
1963. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Van Nostrand-Reinhold Co., N. Y. 810 pp.
- GREAR, J. W.
1966. Cytogeography of *Orontium aquaticum* (Araceae). *Rhodora* 68:25-34.
- HARPER, R. M.
1936. Is *Acorus calamus* native in the United States? *Torreya* 36:143-147.
- HARRISON, D. E. and E. O. BEAL
1964. The Lemnaceae (Duckweeds) of North Carolina. *J. Elisha Mitchell Soc.* 80:12-18.

- HENDRICKS, A. J.
1957. A revision of the genus *Alisma* (Dill.) L. *Am. Midl. Nat.* 54:470-493.
- HOTCHKISS, N.
1964. Pondweeds and pondweedlike plants of eastern North America. *U. S. Fish and Wildlife Cir.* 187. 30 pp.
- HOTCHKISS, N. and H. L. DOZIER
1949. Taxonomy and distribution of N. American Cat-tails. *Am. Midl. Nat.* 41: 237-254.
- KLEKOWSKI, E. J. and E. O. BEAL
1965. A study of variation in the *Potamogeton capillaceus* - *diversifolius* complex (Potamogetonaceae). *Brittonia* 17:175-181.
- LOWE, E. N.
1921. Plants of Mississippi. *Miss. State Geol. Survey Bull.* 17. 293 pp.
- OGDEN, E. C.
1966. Potamogetonaceae. (in) C. L. Lundell, *Flora of Texas* 1(3):369-382, plates 48-56.
- RADFORD, A. E., H. E. AHLES, and C. R. BELL
1968. Manual of the vascular flora of the Carolinas. Univ. N. C. Press, Chapel Hill. 1183 pp.
- ST. JOHN, H.
1961. Monograph of *Egeria* Planchon. *Darwiniana* 12:293-307.
1965. Monograph of the genus *Elodea*: part 4 and summary. *Rhodora* 67:1-35.
- SMALL, J. K.
1933. Manual of the southeastern Flora. (reprint) Univ. N. C. Press. Chapel Hill. 1554 pp.
- STEYERMARK, J. A.
1963. Flora of Missouri. Iowa State Univ. Press, Ames. 1725 pp.
- WILSON, K. A.
1960. The genera of the Arales in the southeastern United States. *J. Arnold Arbor.* 41:47-72.
- WOOTEN, J. W.
1973. Taxonomy of seven species of *Sagittaria* from eastern North America. *Brittonia* 25:64-74.